

3-87. Simplify the following expressions using the order of operations.

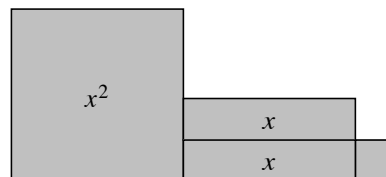
a.  $3(8 - 4) + 4^2 - (2 + 3)$

b.  $7 \cdot 4 - 3 \cdot 8 + 2^2 - 6$

c.  $7 - (-3) + (-4 + 3)$

d.  $-6 - 4(3 \cdot 2) + 5^2$

3-88. Write expressions for the perimeter and the area of this algebra tile shape. Then simplify each expression by combining like terms.



## 3.2.4 How can I represent it?

Using Variables to Represent Quantities in Word Problems



In Section 2.1, you used variables to help you describe the perimeter of tiles. In that situation  $x$  could be stretched to represent any positive number. Today you will continue to use the 5-D Process as you solve word problems and you will use a variable to represent the unknown value in the problem.

Think of these questions as you work on the problems today:

What is the problem asking?

What is the relationship between the quantities involved?

How can I choose which part of the problem to represent with a variable?

3-89. Thu has one mini-box of Choco-Blasters, and Warren gave her three more pieces. Samara has two mini-boxes of Choco-Blasters and she gave six pieces to Will. Now Thu and Samara have the same number of Choco-Blasters left.

How many Choco-Blasters are in a mini-box?  
Assuming all mini-boxes of Choco-Blasters have the same number of pieces in them, use the 5-D Process to solve this problem.



- 3-90. Allen's team was working on a problem but did not have time to finish it. They also did not follow the teacher's directions for showing work in the Define section. Discuss with your team what information you can get from Allen's table below.

	Define		Do	Decide
	Length	Width	Double each side and add together	Target perimeter = 36?
Trial 1:	3	9	$2(3) + 2(9) = 24$	Too small
Trial 2:	4	?		

- Is there enough information in Allen's table to finish the problem? Why or why not?
  - What would you need to know in order to complete Trial 2? Explain your thinking.
- 3-91. Allen's teammate, Scott, was also working on problem 3-90, but he organized his table differently. As Scott explained his table to Allen, he used the pattern in the first two trials to represent the quantities with a variable,  $x$ .

Look at the table below.

- How is it different from Allen's chart?
- What does the  $x$  in the table represent?
- Describe the relationship between the length and the width in words.
- Where did the expression  $x + x + (2x + 3) + (2x + 3)$  come from? Explain your thinking.

	Define		Do	Decide
	Length	Width	Add all 4 sides together	Target perimeter = 36?
Trial 1:	3	$2(3) + 3$	$3 + 3 + 9 + 9 = 24$	Too small
Trial 2:	6	$2(6) + 3$	$6 + 6 + 15 + 15 = 42$	Too large
	$x$	$2(x) + 3$	$x + x + (2x + 3) + (2x + 3)$	

- 3-92. Izzy's team used a 5-D table to solve a problem that involved **consecutive integers**, which are integers that follow each other on a number line. The numbers 1, 2, 3, ..., 14, 15, 16, ..., or  $-5, -4, -3, \dots$  are all examples of consecutive integers. The table below shows part of their work on the problem.

Copy the chart and finish the problem. Apply Scott's idea from problem 3-91 to add variable summaries in the chart after you find a solution.

	Define			Do	Decide
	1 <sup>st</sup> number	2 <sup>nd</sup> number	3 <sup>rd</sup> number	Add all numbers together	Target sum = 57
Trial 1:	15	$15 + 1$	$15 + 2$	$15 + 16 + 17 = 48$	Too small
Trial 2:	20	$20 + 1$	$20 + 2$	$20 + 21 + 22 = 63$	Too large

- 3-93. Meiko saw someone's expressions in the 5-D Process table below and wanted to **reverse** the process. The problem involved a bag of green, red, and blue marbles.

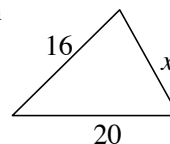
	Define			Do	Decide
	Green	Red	Blue	Total Marbles	Total = 71?
Trial 1:	15				
	$x$	$x - 2$	$2x + 5$	$x + (x - 2) + (2x + 5)$	

- One of the variable expressions describes how the number of red marbles compares with the number of green marbles. How can you describe this relationship in words?
- Based on the variable expressions, use words to describe how the number of blue marbles compares with the number of green marbles.
- How many total marbles are in the bag?
- If there are 15 green marbles in the bag, how many red and blue marbles are in the bag? Show your work.

- 3-94. Camille knew that a triangle had one side with a length of 16 inches and another side was 20 inches. She did not know the length of the third side, but she did know that the perimeter was five times the length of the unknown side. How long is the unknown side?

**Describe/Draw:**

Perimeter is 5 times unknown



Copy the table below and complete the chart. You may add as many rows as you need to solve the problem. Remember to summarize the relationships with a variable line and to complete the Declare sentence.

Define		Do	Decide
Unknown Side	Perimeter	Compare sum to perimeter	Same?
Trial 1: 5	5(5)	$5 + 16 + 20 = 25$ $41 \neq 25$	No

**Declare:**

- 3-95. Margaret was working on the problem below:

Michael earned four times as much money last summer as his sister Mackenzie. Together they earned \$475. How much did each person earn?



The table below shows the first two trials Margaret made. Based on the results, work with your study team to suggest a number she should try next. (You do not need to solve the problem.) Is it **reasonable** for different members of your team to suggest different numbers?

- Are there some numbers that would not be helpful? Explain.

Define		Do	Decide
Mackenzie's earnings	Michael's earnings	Add both of their earnings together	Target sum = \$475
Trial 1: \$50	4(\$50)	$\$50 + \$200 = \$250$	Too small
Trial 2: \$100	4(\$100)	$\$100 + \$400 = \$500$	Too large


- 3-96. Dawn and Myrna's father has asked them to build a rectangular pen for their dog. They have 74 feet of fencing. They want the length to be one more than twice the width. Use the 5-D Process to help Dawn and Myrna find the dimensions (both length and width) of the pen.

- 3-97. **Additional Challenge:** Use the 5-D Process to find three consecutive integers that have a product of 3360.

3-98. LEARNING LOG

In your Learning Log, describe how you decide which number to use as your first trial in the 5-D Process. Then explain how you use the results of your first trial to choose your next trial number. You may want to include an example from your recent work to help you explain. Title this entry, “Defining and Deciding” and label it with today’s date.





MATH NOTES

## METHODS AND MEANINGS

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### Consecutive Integers

**Consecutive integers** are integers that come “one after another” in order (that is, without skipping any of them). For example: 11, 12, and 13 are three consecutive integers. The numbers 10, 12, 14, and 16 are four **consecutive even integers** because in counting up from 10, no even numbers are skipped. Likewise, 15, 17, and 19 are **consecutive odd integers**.

At times in algebra it is necessary to represent a list of consecutive integers. To represent any list in **general** we must use variables, and it is common to let  $x$  represent the first integer. See the examples of how to write a list of consecutive integers below:

Three consecutive integers:  $x, x + 1, x + 2$

Three consecutive odd integers:  $x, x + 2, x + 4$

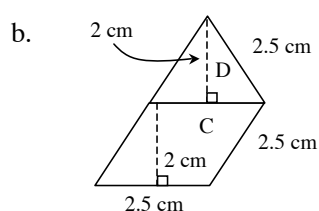
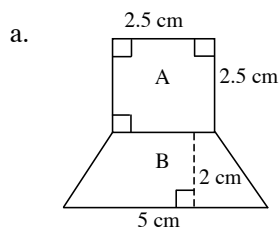
Three consecutive even integers:  $x, x + 2, x + 4$

Note that consecutive even integers and odd integers look alike because both even integers and odd integers are two apart.



- 3-99. Think about the mathematical process you use as you solve the following problems. Show your work and your solutions.
- If there are 100 students in a room and 40 of them are boys, how many are girls?
  - If there are 17 blue and white stripes on a flag and 9 of them are blue, how many are white?
  - If there are 250 pennies and dimes in a box and 130 of them are pennies, how many are dimes.
  - Now **generalize**: Imagine you know how many items you have in a collection of two types of things. If you know how many of one of the items you have, how could you find how many of the other item you have?
- 3-100. Copy and simplify each expression.
- |                    |                     |                         |
|--------------------|---------------------|-------------------------|
| a. $-2 + 5$        | b. $(-4) \cdot (6)$ | c. $4 - (-3)$           |
| d. $10 + (-2) - 7$ | e. $-5 - 3(2 - 6)$  | f. $(3 - 3)(10^2 - 11)$ |
- 3-101. Daisy and Alexandra each have a group of algebra tiles on their desks as described below.
- Daisy has these tiles:  $x$ ,  $x$ ,  $x^2$ ,  $1$ ,  $x^2$ ,  $x$ ,  $x^2$ , and  $x$ .
- Alexandra has  $x^2$ ,  $x$ ,  $1$ ,  $1$ ,  $1$ ,  $x$ ,  $x^2$ ,  $x$ , and  $1$ .
- Sketch each girl's tiles.
  - If the girls put their tiles together, how many of each type of tile will they have? Write an expression that represents this sum.
- 3-102. Rewrite each percent as a fraction and each fraction as a percent.
- |        |                  |        |                  |
|--------|------------------|--------|------------------|
| a. 20% | b. $\frac{2}{5}$ | c. 75% | d. $\frac{2}{3}$ |
|--------|------------------|--------|------------------|

- 3-103. Manuel used Pattern Blocks to build the shapes below. The block marked “A” is a square, “B” is a trapezoid, “C” is a rhombus (a parallelogram with equal sides) and “D” is a triangle. Find the area of Manuel’s shapes.



## 3.2.5 How can I solve it?

### More Word Problem Solving



So far in Section 3.2, you have been using a 5-D Process as a way to organize and solve problems. Today you will continue using this process to solve problems in a variety of situations.

As you work, use the following questions to focus your team’s discussion:

What is the problem asking?

What is the relationship between the quantities involved?

How can we decide which part of the problem to represent as  $x$ ?

What if a different quantity were represented with  $x$ ?